

IN THE CLAIMS

Please cancel claims 14-26, amend claims 1 and 27 and add claims 40 and 41 as follows:

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1. (AMENDED) A tunable laser comprising:  
a gain section for creating a light beam and for providing gain for the light beam;  
a phase section for controlling the light beam around a center frequency of a bandwidth;  
a waveguide for guiding and reflecting the light beam in a cavity included in the waveguide,  
the waveguide including a relatively low energy bandgap separate-confinement-heterostructure (SCH);  
a front mirror bounding an end of the cavity; and  
a back mirror bounding an opposite end of the cavity;  
wherein additional gain for the light beam is provided by at least one of the group  
comprising the phase section, the front mirror and the back mirror in order to partially compensate  
for losses associated with tuning.

2. The laser of claim 1, wherein the gain provided by at least one of group comprising  
the phase section, the front mirror and the back mirror has a saturation power higher than  
substantially 5 mW.

3. The laser of claim 1, wherein the waveguide including the SCH is uniform across the  
gain and phase sections and the front and back mirrors.

4. The laser of claim 3, wherein the SCH includes centered shallow quantum wells.

5. The laser of claim 3, wherein the SCH is optimized such that the gain builds up  
rapidly to a level substantially equal to that required for a device threshold.

6. The laser of claim 3, wherein each of the gain and phase sections and front and back  
mirrors has an index that is separately adjusted by biases separately altered at each.

7. The laser of claim 6, wherein the indexes are adjusted while a net gain remains at a device threshold.

8. The laser of claim 3, wherein free-carrier absorption loss resulting from a build up of carriers in the SCH is at least partially compensated for by the gain provided by at least one of the group comprising the phase section, the front mirror and the back mirror.

9. The laser of claim 1, wherein the gain provided by the at least one of the group comprising the phase section, the front mirror and the back mirror is modified by a process selected from the group comprising selective quantum well intermixing, selective area growth and butt-joint regrowth of waveguides of different bandgaps.

10. The laser of claim 1, wherein gain is provided by more than one of the group comprising the phase section, the front mirror and the back mirror and each gain is separately modified by a process selected from the group comprising selective quantum well intermixing, selective area growth and butt-joint regrowth of waveguides of different bandgaps.

11. The laser of claim 10, wherein gain is provided by the front mirror modified by selective quantum well intermixing and gain is provided by the back mirror modified by selective quantum well intermixing wherein each intermixing produces different bandgap regions.

12. The laser of claim 10, wherein the gain section has relatively low quantum well and high SCH bandgaps.

13. The laser of claim 1, wherein the gain provided by at least one of the group comprising the phase section, the front mirror and the back mirror is applied through an electrical contact interlaced with a tuning electrical contact.

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27. (AMENDED) An article of manufacture comprising a sampled-grating distributed Bragg reflector (SGDBR) laser, the SGDBR laser comprising:

- a gain section for creating a light beam and for providing gain for the light beam;
- a phase section for controlling the light beam around a center frequency of a bandwidth;
- a waveguide for guiding and reflecting the light beam in a cavity included in the waveguide, the waveguide including a relatively low energy bandgap separate-confinement-heterostructure (SCH);
- a front mirror bounding an end of the cavity; and
- a back mirror bounding an opposite end of the cavity;

wherein additional gain for the light beam is provided by at least one of the group comprising the phase section, the front mirror and the back mirror in order to partially compensate for losses associated with tuning.

28. The article of claim 27, wherein the gain provided by at least one of group comprising the phase section, the front mirror and the back mirror has a saturation power higher than substantially 5 mW.

29. The article of claim 27, wherein the waveguide including the SCH is uniform across the gain and phase sections and the front and back mirrors.

30. The article of claim 29, wherein the SCH includes centered shallow quantum wells.

31. The article of claim 29, wherein the SCH is optimized such that the gain builds up rapidly to a level substantially equal to that required for a device threshold.

32. The article of claim 29, wherein each of the gain and phase sections and front and back mirrors has an index that is separately adjusted by biases separately altered at each.

33. The article of claim 32, wherein the indexes are adjusted while a net gain remains at a device threshold.

34. The article of claim 29, wherein free-carrier absorption loss resulting from a build up of carriers in the SCH is at least partially compensated for by the gain provided by at least one of the group comprising the phase section, the front mirror and the back mirror.

35. The article of claim 27, wherein the gain provided by the at least one of the group comprising the phase section, the front mirror and the back mirror is modified by a process selected from the group comprising selective quantum well intermixing, selective area growth and butt-joint regrowth of waveguides of different bandgaps.

36. The article of claim 27, wherein gain is provided by more than one of the group comprising the phase section, the front mirror and the back mirror and each gain is separately modified by a process selected from the group comprising selective quantum well intermixing, selective area growth and butt-joint regrowth of waveguides of different bandgaps.

37. The article of claim 36, wherein gain is provided by the front mirror modified by selective quantum well intermixing and gain is provided by the back mirror modified by selective quantum well intermixing wherein each intermixing produces different bandgap regions.

38. The article of claim 36, wherein the gain section has relatively low quantum well and high SCH bandgaps.

39. The article of claim 27, wherein the gain provided by at least one of the group comprising the phase section, the front mirror and the back mirror is applied through an electrical contact interlaced with a tuning electrical contact.

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40. (NEW) The laser of claim 1, wherein the gain section has relatively low quantum well and high SCH bandgaps.

41. (NEW) The article of claim 27, wherein the gain section has relatively low quantum well and high SCH bandgaps.